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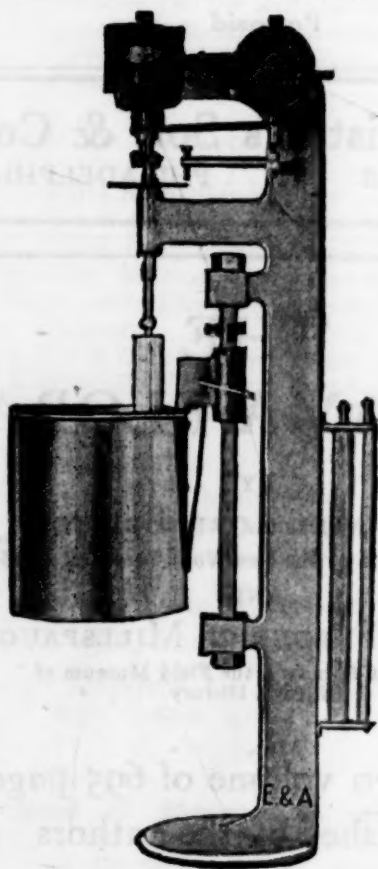
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# SCIENCE

FRIDAY, NOVEMBER 26, 1920

HARMON NORTHRUP MORSE

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MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

AFTER a long life spent in service in Johns Hopkins University Professor Morse died September 8, in the seventy-second year of his age. He was born October 15, 1848, at Cambridge, Vermont, the son of a farmer, and died at Chebeague, Maine, where he had spent his summers for many years. He was graduated from Amherst College in 1873, then went to Göttingen, and received the degree of Ph.D. from that university in 1875. The year 1875-76 was spent at Amherst as assistant in chemistry. In 1875 it was announced that the Johns Hopkins University would begin its work in the year 1876. Shortly after it became known that the writer of this notice was to be the professor of chemistry in the new university he received a call from Morse who brought a letter of introduction from Emerson. This letter led me to take more than ordinary interest in the bearer. Whatever we were to do in Baltimore, it seemed clear that I should need an assistant, and I told him I would in due time arrange for his appointment. Hearing a little later of the fellowships that were to be awarded I secured one of these for Morse and so his connection with the Johns Hopkins University began. Before the doors were opened, however, he was designated associate, and we began our work together for better or for worse. We had no laboratory. We had less than a handful of students. What was to come of it? I need not go into the story, thus suggested except to say that we were absolutely untrammelled and left to work out our own salvation. Morse and I were of one mind as to the object to be attained and there were no discussions in regard to the methods to be adopted. They were not original, but they had never been tried in this country. There had never been an opportunity. The opportunity that many of us had hoped for, had dreamed of, was furnished by the bounty

of Johns Hopkins and the wisdom of his trustees and of President Gilman.

Morse remained an associate until 1883, when he became an associate professor. In 1892 he was promoted to be professor of inorganic and analytical chemistry, and in 1908 he became director of the chemical laboratory. In 1916 he withdrew from active service and became professor emeritus.

From the beginning of our work in the new university the importance of research was emphasized. That was indeed its most characteristic feature. Morse was as anxious as any of us to take part in this work. For one reason and another it was some time before he got going. To be sure he did show his hand in some small and rather unpromising pieces of work and I think he became discouraged, but he was faithful to his teaching. Gradually, however, his researches opened up new fields and he began their exploration. This is not the place for a full review of his contributions, and those of his last years so overshadowed all that preceded that a reference to those alone will do substantial justice to his memory.

In the early nineties he turned his attention seriously to the question of the stability of solutions of potassium permanganate and in 1896 he published an article on "The production of permanganic acid by manganese superoxide," A. J. Hopkins and M. S. Walker appearing as joint authors. Pursuing this subject Morse and H. G. Byers in 1900 published an article "On the cause of the evolution of oxygen when oxidisable gases are absorbed by permanganic acid." The results were such that it became desirable to obtain an aqueous solution of pure permanganic acid. It was decided to prepare this by dissolving the heptoxide in water. In an article by Morse and J. C. Olsen that appeared in 1900 occurs the following passage:

(We) accordingly prepared a quantity of the anhydride by mixing potassium permanganate and concentrated sulphuric acid in vessels cooled by ice and salt. We soon learned, however, that something more than a low temperature is essential to

safety in handling the product; for a minute quantity of the anhydride—certainly less than half a drop—which had been separated from the sulphuric acid, exploded with great violence and with disastrous results to one of us.<sup>1</sup> Some idea of the force of the explosion may be gained from the fact that one of the flying fragments of glass passed entirely through a burette which was mounted in the vicinity, leaving holes over half the diameter of the burette, edges of which were entirely free from cracks. After this experience, we decided to abandon the anhydride as a source of the acid, and to work out, if practicable, an electrolytic method of separating it from its salts.

The electrolytic method worked very satisfactorily, and led to the further use of this method in the preparation of osmotic membranes. The first results of this investigation are given in an article by Morse and D. W. Horn that appeared in 1901. They say:

In this connection, it occurred to the authors that if a solution of a copper salt and one of potassium ferrocyanide are separated by a porous wall which is filled with water, and a current is passed from an electrode in the former to another in the latter solution the copper and the ferrocyanogen ions must meet in the interior of the wall and separate as copper ferrocyanide at all points of meeting, so that in the end there should be built up a continuous membrane well supported on either side by the material of the wall. The results of our experiments in this direction appear to have justified the expectation and to be worthy of a brief preliminary notice.

This marks the real beginning of the work on osmotic pressure with which the name of Morse will always be associated. But before the cells were available and therefore before any reliable measurements could be made, years of patient, skilful work were still necessary. Difficulties that seemed insurmountable frequently arose and necessitated new efforts. It must be said that some of us in the laboratory, including myself, at times

<sup>1</sup> To make this story complete it should be added that Morse was the "one of us" here referred to. A piece of glass passed through the tissues of his neck in close proximity to the jugular vein. His escape from death was almost miraculous.



lost faith in the ultimate success of the work and were perhaps inclined to advise the use of cells that were not perfect. But Morse went steadily on. He had in mind a practically perfect cell that could be used for high pressures as well as low. He tried all sorts and conditions of clay and after many, many discouragements he succeeded in finding one and in making a satisfactory glaze quite different from any available, and he achieved success.

In 1902 he and J. C. W. Frazer described "The preparation of cells for the measurement of high osmotic pressures." A careful reading of this article will give some idea of the tremendous difficulties that were met and overcome. The closing paragraph may be advantageously quoted in this connection:

The difficulties of construction are by no means completely overcome, and we have in view a number of changes which we hope will prove of advantage. That these difficulties are of great magnitude will be realized if one considers that in our last experiment the pressure which was measured and which was still below what we were called upon to control would suffice to raise a column of water at 20° to a point 15 meters higher than the top of the Eiffel tower, or which would raise from its base a marble shaft whose height is 120 meters. These comparisons will perhaps make it clear that the most painstaking attention to every detail of construction is absolutely essential to success when an apparatus like ours is to be made up of several parts, consisting of different materials, and which must be united without the usual mechanical means of securing strong joints.

Soon after this the Carnegie Institution of Washington lent its powerful aid to the large investigation thus begun. In 1914 the institution published a memoir entitled "The Osmotic Pressure of Aqueous Solutions: Report on Investigations made in the Chemical Laboratory of the Johns Hopkins University during the years 1899-1913. By H. N. Morse." In it is given a detailed account of this remarkable piece of experimental work. Any one who reads it understandingly will recognize that no one but a master of experiment could have done this. The work required the highest degree of resourcefulness

and skill, of patience and persistence. Any one of ordinary caliber would have stopped short of the accomplishment. Morse was not satisfied with anything but perfection as nearly as this could be reached, and as it never can be reached he worried about the residual no matter how small it might be. In the concluding chapter of the Carnegie Memoir occur these words:

The work reported upon in the preceding chapters is only a fraction of the task which the author hopes to accomplish, or to see accomplished by others. The investigation—already fifteen years old—was undertaken, in the first instance, with a view to developing a practicable and fairly precise method for the direct measurement of the osmotic pressure of aqueous solutions. The need of such a method for the investigation of solutions seemed to the author very great and very urgent.

Honors came to him rather late but they came, the chief among these was the award of the Avogadro Medal of the Turin Academy of Sciences, in 1916.

In 1911 an international congress of scientists assembled at Turin, Italy, to celebrate the centennial of the announcement of the hypothesis of Avogadro. Those in attendance decided to award a medal to be known as the Avogadro Medal. This medal was to be awarded to the investigator who should, in the judgment of the awarding committee, make the most valuable contribution to the subject of molecular physics during the years 1912, 1913 and 1914.

A few words in regard to Morse, the man. He was quiet and uneffusive. He did not care for the ordinary intercourse with his fellowmen. He lived, when not in the laboratory, for his family and a few kindred spirits. He married twice and had four children—a daughter and three sons. His second wife, who was Miss Elizabeth Dennis Clark, of Portland, Maine, his daughter and two sons survive him. In his later years his wife was of great assistance to him in preparing his articles for publication and was a true helpmate in every way.

For many years he spent his summers at Chebeague in the beautiful Casco Bay. Here

he had a simple comfortable cottage and a garden. He delighted to work, both in and out of the house, and this gave him his exercise. He was rather stout and he knew that he needed exercise to keep his weight down. He therefore indulged in walking, bicycling and finally in motoring, and he managed to keep fairly well. But, after his retirement in 1916, his health failed. His strength gave out and his courage also. He did not dare to take his car out of the garage, and his walks were very short. I saw him in May, just before he went to Maine, and thought he seemed more like his old self. He even talked of taking up his work again. It was not to be. I heard nothing from him after that. And then came the despatch announcing his rather sudden and entirely unexpected death. He was buried at Amherst, a place that meant so much to him—where he had spent his college years and for some time had had a summer home.

IRA REMSEN

#### WILHELM WUNDT, 1832-1920

THE death of Wundt removes the foremost figure of our academic world: a great man of science, a philosopher of repute, a prolific writer, a personality of extraordinary influence. Psychology, the science with which his name is permanently connected, was fortunate both in the date of his birth and in the length of his life. He came into the world a full decade later than Helmholtz and Virchow and Du Bois and Leuckart, Huxley and Tyndall and Spencer, the standard-bearers of science in the middle of the nineteenth century; so that, while his work and theirs overlapped, he still reaped the benefit of their pioneer labors. His length of days and the maintenance of his intellectual vigor not only enabled him to round off his manifold tasks—we all rejoice that the "Völkerpsychologie" is done, as we all rejoiced when Spencer published the final part of his "Synthetic Philosophy"—but also gave a much-needed stability to the young science of experimental psychology, whose name he coined and whose interest lay always nearest to his heart.

Wundt's outward life was uneventful. After a half-dozen years of study, principally in medicine, at the universities of Tübingen, Heidelberg and Berlin, he settled down as docent (1857) and assistant professor (1864) of physiology at Heidelberg, where Helmholtz held the chair of physiology from 1858 to 1871. In 1874 he was called as professor of philosophy to Zurich, and in 1875 was chosen in preference to Horwicz (who nowadays reads the once famous *Analysen?*) as professor of philosophy at Leipzig. Here he remained till the end of his life, gathering in his harvest of academic honors: the rectorship of his university, the honorary citizenship of the town, the order *pour la mérité*, the title of *wirklicher Geheimrat* of the kingdom of Saxony. He lived the simple family life of the older German tradition, and his days passed with the regularity of clockwork: the morning he spent on his current book or paper; then came the *Sprechstunde*; then, after the midday meal, his solitary constitutional in the park; then the formal visit to the laboratory; then the lecture; and then an informal gathering in the laboratory again. Wundt was an effective lecturer, and made no use of notes, though he always carried in his pocket a scrap of paper upon which notes had been made. He was devotedly cared for by his wife and, after her death, by his daughter, "meiner treuen Gefährtin im Urwald der Mythen und Märchen." His son turned some years since from philology to philosophy, and has written a valuable work upon Greek ethics.

Under these outward conditions, simple and sheltered, Wundt carried on his varied literary activities. If I were asked to pick out the most original and constructive items of his published work, I should name in the first place his "Beiträge zur Theorie der Sinneswahrnehmung" (1862), a rounded series of researches upon tactual and visual perception which contains in germ the doctrine of the later and better known *Physiologische Psychologie*. I should name, secondly, the *Untersuchungen zur Mechanik der Nerven und Nervencentren* (1871-1876), a solid bit of



experimental investigation, quoted with respect by later physiologists. I should name, thirdly, the second part (*Methodenlehre*) of the "Logik" (1883 and later), which carries on the work of Mill and Jevons, but far outranks its predecessors in depth of insight and range of positive knowledge. I should name, fourthly, the highly characteristic "Psychologismus und Logizismus" of 1910; Wundt was at his best, constructively and historically, when he had been spurred into action by the success of what he thought a scientific heresy. And I should name, last, the little "Einführung in die Psychologie" (1911), a book in which Wundt's consummate mastery of his subject and the sweep and freedom of his style bring him as near as he ever came to the popular conception of a genius.

I have not included in this list the "Grundzüge der physiologischen Psychologie." Every one knows that Wundt founded, in 1879, the first laboratory of experimental psychology; and every one knows that the *PP*, as his students have dubbed it, is the standard work of reference for that science. The book was, no doubt, born of a great idea; and it is, without question, indispensable to the psychologist. But I do not think that it is a great book; that, in the very nature of the case, it could hardly be. Its one serious rival, Brentano's "Psychologie vom empirischen Standpunkte," which saw the light in the same year (1874), is great both in conception and so far as it goes—it goes only half-way to its appointed goal—in execution; as late as 1907 Brentano had published only two minor corrections of his original text. But Wundt was attempting an impossible task, the welding of a highly imperfect nerve-physiology to a rudimentary experimental psychology. He approached it with full scientific equipment and with no small measure of literary skill; the result, none the less, was inevitably an encyclopedic handbook of the two disciplines rather than a single physiological psychology. So it comes about that Brentano's "Empirical Psychology" stands to-day as it stood nearly fifty years ago, while the *PP* has lumbered through edition after edition, hardly even

aiming at system before the fifth (1902-3), and still badly needing system in the sixth and last (1908-11). The demand for these editions proves that the book is, as I said just now, indispensable to the working psychologist, and we can not be too grateful to Wundt for the time and labor spent upon the successive revisions. It would be a pity, however, if he were to be judged by a work which, characteristically thorough and painstaking as it is, still represents only one side, and that perhaps the least original, of his efforts on behalf of experimental psychology. The Wundt who organized the Leipzig laboratory, and who wrote or directed the investigations that fill the twenty volumes of the "Philosophische" and the ten of the "Psychologische Studien," is larger than the Wundt of the familiar book.

The long series of editions proves, of course, that the *PP* has appealed to a far wider circle than that of the professional psychologists. Wundt, indeed, has always been singularly successful with his literary ventures. We expect that a class-text, if it survives the first crucial year, will be often reprinted; but we do not expect that three-volume works on ethics and logic, to say nothing of a "System der Philosophie" which expresses its author's personal convictions in highly abstract terms, will again and yet again demand revision and reissue during their writer's lifetime. Such, nevertheless, has been Wundt's fortune. Most astonishing of all is the career of a semi-popular book, translated into English under the title "Lectures on Human and Animal Psychology": first published in two volumes in 1863, it achieved its sixth edition, as a single volume, in 1919. Not that there is any real reduction in size!—that has not been Wundt's habit. On the contrary: the lectures of the original edition that dealt with social psychology have simply been excluded, and their modern equivalent published separately, in the ten large volumes of the "Völkerpsychologie."

So we are brought to this tremendous achievement of Wundt's old age. He published the first two volumes, on Language, in

1900, when he was already nearly seventy; he published the concluding volume, on Civilization and History, in 1920. The intervening volumes deal in turn with Art, Myth and Religion, Society and Law. The whole undertaking grew out of Wundt's early conviction that psychological experiment breaks down on the far side of perception and memory, so that the processes of thought and of constructive imagination must be studied by other than experimental means. Hence a "Völkerpsychologie" is, for him, the direct continuation and supplement of experimental psychology. We may dispute his standpoint: we may question whether experiment fails where he makes it fail, and we may question further whether his own social psychology is not rather an application of his individual psychology to the data of social anthropology than the path to a discovery of new psychological principles. We may doubt also whether the time is ripe for generalization, whether there is not more to be gained by intensive labor. But no one who reads the book can fail to pay his tribute of admiration to its unfailing vitality, to its masterful ordering of detail, to its theoretical consistency. The "Kultur und Geschichte" ends on a somewhat forced note of optimism, beneath which there sounds—as how should there not?—a steady undertone of strained perplexity. Yet it is only here and there that the attentive reader discerns a momentary lapse either of style or of logic; the intellectual freshness is maintained to the end.

The significance of Wundt's whole work, if one tries to sum it up in a sentence, lies in the fact that he is the first considerable figure in the history of thought to attack the problems of science and philosophy from the psychological standpoint. Wundt was a born psychologist; and if others before him had a similar temperament, they had not the same opportunity. Wundt himself struggled into psychology, and never shook himself entirely free either of past philosophical systems or of the all-too-logical biology of the first Darwinian time. But he grew with the years: the last edition of the "Physiologische Psycho-

logie" is better psychology than the first. He has often been compared with Herbert Spencer; he himself would prefer to be considered a modern follower of Leibniz. Neither comparison satisfies. Wundt was unique, and we shall not look upon his like again.

EDWARD BRADFORD TITCHENER  
CORNELL UNIVERSITY

#### ON THE DETERMINATION OF GEO- CHRONOLOGY BY A STUDY OF LAMINATED DEPOSITS

IN SCIENCE of September 24, 1920, a highly esteemed geologist<sup>1</sup> has honored the Swedish expedition now studying some of the laminated clay deposits of North America with a discussion of its aims and work which seems to call for some reply.

The main purpose of our expedition may be stated as being less the hope of making new discoveries than a first attempt to apply to the late Quaternary deposits in North America the theories that have been developed in Sweden by many years of extensive investigations. There by systematic measurements of certain periodically laminated layers of late Quaternary age we have succeeded in establishing a real, continuous and exact time scale and not merely determinations applicable to isolated localities. Of course many and serious difficulties have been met, and it has taken much time—more than forty years—to overcome them all. The latest and most important progress was my discovery, five years ago, that the variation in thickness of annual layers deposited at different places along the same ice border could be identified, even at the greatest distances from which measurements were obtained, local errors being absent. This indicated a common, general climatic cause. If it can be shown that similar annual variations occur on both sides of the Atlantic, as far as the extension of one and the same climatic zone [can be assumed], it means that the cause must be sought in

<sup>1</sup> Fairchild, H. L., "Pleistocene clays as a chronometer," SCIENCE, N. S., Vol. 52, p. 284, 1920.



variation in the amount of heat radiating from the sun.

The premises advanced have not hitherto given rise to any other conclusion as to the cause of the Ice Age than that a solution of the problem, in its general nature, can be reached in this way.

With respect to the method of overcoming the difficulties of the new branch of investigation the brief memorandum which I issued, which was intended mainly for specialists, could only refer to a somewhat more comprehensive statement of mine,<sup>2</sup> which also gave a short historical review from 1878. From this review it may be learned that after publishing in 1884 my first plan of obtaining a geochronology, but before trying earnestly to follow it out, I was so impressed with the supposed difficulties of the task that it was not until 1904, or twenty years later, that I took the matter up seriously. Thus I am indeed well aware that it is not enough to be cautious, one must also be audacious.

Having thus myself delayed for twenty years, it was just with a thought of the daring energy of my esteemed American friends that I gave myself the hope of trying by something like a spurt to regain some portion of the time which had been lost. As may be known by all who have followed this question, the investigations thus begun have been unexpectedly successful in results.

On the present occasion I have appealed to the kind collaboration of my American friends for organizing with their aid the application on their continent of a method of investigation which already has been tested in a region, the nature of which from several points of view has a striking similarity with that of the formerly glaciated regions of North America. Yet, the glaciation of this latter continent was much more extended than that of northern Europe. Certain parts of its highly interesting glacial geology, according to the admirable investigations of the

<sup>2</sup> Gerard de Geer, "A geochronology of the last 12,000 years." Presidential address, Eleventh International Geological Congress, Stockholm, 1910—Map and diagrams. *Comptes Rendus*, 1912.

American geologists, showing a very complicated late glacial evolution, it seems highly probable that the introduction and use of a real time scale here will be of special interest and that comparisons with the conditions in Sweden and other parts of northern Europe will doubtless be very instructive in many respects.

In the hope of a continued, fruitful collaboration I use this occasion to express my hearty thanks for the great hospitality and all the kind interest, which from so many sides, in the United States as well as in Canada, have been shown to the expedition, and especially so from the American Scandinavian Foundation, which never fails to support every initiative aiming at the evolution of our mutual relationships.

DE GEER

#### SCIENTIFIC EVENTS

##### DEDICATION OF THE NEW LABORATORY BUILDING OF THE BUREAU OF FISHERIES AT FAIRPORT, IOWA

At the United States Fisheries Biological Station at Fairport, Iowa, the new laboratory building has been publicly dedicated in the presence of a large assemblage composed of representatives of various state universities, the pearl-button industry and the Bureau of Fisheries, together with the Assistant Secretary of Commerce and the member of congress from the Fairport district.

The new laboratory, which is constructed of concrete, stone and brick, replaces a frame building destroyed by fire in 1917. The building is about 100 by 50 feet, with three stories and half basement; and is superior to the old structure in respect of serviceability, convenience and capacity. The laboratory accommodations for 16 investigators may be increased as circumstances require. A well-lighted library, a chemical laboratory, a photographic room, a museum, a mess hall and kitchen, and tank and aquarium rooms in addition to offices are among the useful features of the building.

The dedication exercises were as follows:

Remarks by the chairman, Hon. Albert F. Dawson, former member of Congress from the district; presentation of the building to the Department of Commerce, by Professor James M. White, architect; acceptance of the laboratory on behalf of the Department of Commerce and delivery to the Bureau of Fisheries, by Hon. Edwin F. Sweet, assistant secretary of commerce, with address on "Federal and State responsibility for maintaining resources of interstate waters"; response by Dr. Hugh M. Smith, Commissioner of Fisheries; address on "Significance of the station to industries," by Hon. Harry E. Hull, member of Congress; address on "Aquiculture and science," by Dr. Edward A. Birge, president of the University of Wisconsin; address on "The spirit of cooperation in the Bureau of Fisheries," by Professor Frank R. Lillie, University of Chicago; address on "The fisheries biological station in relation to the universities," by Professor George Lefevre, University of Missouri; and address on "The station as an aid to pure science," by Professor Charles C. Nutting, University of Iowa.

On the day following the dedicatory exercises there was held in the laboratory building a conference regarding the application of science to the utilization and preservation of the resources of interior waters. The chairman of the conference was Professor S. A. Forbes, University of Illinois, and the principal address was by Professor James G. Needham, Cornell University, on "The biological resources of our inland waters."

#### THE CHICAGO MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE history of science is to be a part of the field covered by the new Section L (Historical and Philological Sciences) of the American Association for the Advancement of Science. A temporary committee to have charge of the organization of this aspect of Section L has been appointed by the President of the Association. The personnel of this committee is as follows: Dr. William A. Locy (chairman), Northwestern University, Evanston, Ill.; Mr. Frederick E. Brasch (secretary),

The John Crerar Library, Chicago, Ill.; Dr. Florian Cajori, University of California, Berkeley, Calif.; Professor A. P. Carman, University of Illinois, Urbana, Ill.; Professor Henry G. Gale, University of Chicago, Ill.; Dr. Charles Judson Herrick, University of Chicago, Chicago, Ill.; Dr. Felix Neumann, War Department, Washington, D. C.; Dr. George Sarton, Harvard University, Cambridge Mass.; Dr. William H. Welch, The Johns Hopkins University, Chicago, Ill. A program on the History of Science is being planned for the approaching Chicago meeting.

In accordance with a recent action of the executive committee of the council of the American Association, the president of the association has appointed a special committee to cooperate with the officers of the new Section H (Anthropology), to organize the section and prepare a program for the Chicago meeting. The vice-president of the new section is Dr. A. E. Jenks, University of Minnesota, Minneapolis, Minn. The secretary is Dr. E. A. Hooton, Peabody Museum, Cambridge, Mass. The special committee just appointed has the following personnel: Dr. Clark Wissler (Chairman), American Museum of Natural History, New York, N. Y.; Dr. G. G. MacCurdy (Secretary), Yale University, New Haven Conn.; Dr. Roland B. Dixon, Harvard University, Cambridge, Mass.; Dr. J. Walter Fewkes, Bureau of American Ethnology, Smithsonian Institution, Washington, D. C.; Dr. Aleš Hrdlička, U. S. National Museum, Washington, D. C.; Dr. A. L. Kroeber, University of California, Berkeley, Calif.; Dr. F. G. Speck, University of Pennsylvania, Philadelphia, Pa.

One of the general-interest, evening sessions of the approaching Chicago meeting of the American Association for the Advancement of Science will be devoted to an illustrated lecture by Dr. R. F. Griggs, of Ohio State University, on his explorations and studies in the volcanic region of Katmai, Alaska. The date and place of this lecture will be announced in the general program, which will be available before the opening of the meeting on December 27.



SCIENTIFIC SOCIETIES MEETING AT CHICAGO

THE following national scientific societies will meet at Chicago during convocation week in affiliation with the American Association for the Advancement of Science. The name of the president is followed by the name of the secretary.

- American Mathematical Society: Dr. F. N. Cole secretary.
- Mathematical Association of America: Dr. David Eugene Smith, Dr. W. D. Cairns.
- American Astronomical Society: Dr. Frank Schlesinger, Dr. Joel Stebbins.
- American Physical Society: Professor J. S. Ames, Dr. Dayton C. Miller.
- American Meteorological Society: Dr. Robert DeC. Ward, Dr. Chas. E. Brooks.
- American Metric Association: Mr. Howard Richards, Jr., sec'y.
- Optical Society of America: Dr. F. K. Richtmyer, Dr. P. D. Foote.
- Geological Society of America: Dr. I. C. Morgan, Dr. E. O. Hovey.
- Association of American Geographers: Dr. Herbert E. Gregory, Dr. Richard E. Dodge.
- National Council of Geography Teachers: Professor R. H. Whitbeck, Professor Geo. J. Miller.
- Paleontological Society of America: Dr. F. B. Loomis, Dr. R. S. Bassler.
- American Society of Naturalists: Dr. Jacques Loeb, Dr. A. Franklin Shull.
- American Society of Zoologists: Dr. Gilman A. Drew, Dr. W. C. Allee.
- Entomological Society of America: Dr. J. M. Aldrich, Sec'y.
- American Association of Economic Entomologists: Dr. Wilmon Newell, Mr. A. F. Burgess.
- American Microscopical Society: Professor T. W. Galloway, Dr. Paul S. Welch.
- Wilson Ornithological Club: Dr. R. M. Strong, Mr. Albert F. Ganier.
- Botanical Society of America: Dr. N. L. Britton, Professor J. R. Schramm.
- American Phytopathological Society: Dr. W. A. Orton, Dr. G. R. Lyman.
- Ecological Society of America: Dr. Barrington Moore, Professor A. O. Weese.
- American Society for Horticulture Science: W. H. Alderman, Dr. C. P. Close.
- Association of Official Seed Analysts: Edgar Brown, A. L. Stone.

- American Nature Study Society: J. A. Drushel, Mrs. A. B. Comstock.
- American Physiological Society: Professor W. P. Lombard, Dr. C. W. Greene.
- American Society of Biological Chemists: Dr. Stanley R. Benedict, Professor Victor C. Myers.
- American Society for Experimental Pathology: Dr. William H. Park, Dr. H. T. Karsner.
- American Society for Pharmacology and Experimental Therapeutics: Dr. A. S. Loevenhart, Dr. E. D. Brown.
- American Society of Bacteriologists: Dr. Chas. Krumwiede, Dr. A. Parker Hitchens.
- American Anthropological Association: Dr. Clark Wissler, Dr. Alfred M. Tozzer.
- American Folk-Lore Society: Dr. Charles Peabody, Sec'y.
- American Psychological Association: Dr. Shepherd I. Franz, Dr. E. G. Boring.
- American Association of University Professors: Professor Edward Capps, Professor H. W. Tyler.
- Society of Sigma Xi: Dr. C. E. McClung, Dr. H. B. Ward.
- Gamma Alpha Graduate Fraternity: Dr. J. R. Musselman, Dr. A. H. Wright.
- Gamma Sigma Delta: Dr. C. H. Eckles, Dr. L. H. Pammel.
- Phi Kappa Phi Fraternity: Dr. J. S. Stevens, Dr. L. H. Pammel.

CENTENARY OF THE MEDICAL COLLEGE OF THE UNIVERSITY OF CINCINNATI

ON Saturday, November 6, the Medical College celebrated the centennial of its founding. One hundred years ago the Medical College of Ohio received its charter from the state with Dr. Daniel Drake, whose name is written deeply in the annals of American medical history, as its first president. The Medical College of the University was the first medical school established west of the Alleghenies and is the third oldest in the country, Harvard and Pennsylvania alone taking precedence.

The college, then called the Medical College of Ohio, had its beginning in a little room above a drug store on Main street. Dr. Daniel Drake, the father of the college, graduated the first class of twenty-four students from this little room in 1821.

In 1896 the Ohio College became the med-

ical department of the University of Cincinnati, and in 1909 the Miami Medical College also become a part of the university.

The building of the present medical college and the city hospital was largely the achievement of Dr. Christian R. Holmes, through whose efforts the University of Cincinnati Medical College has taken front rank in medical education.

At the exercises on November 6, Dr. J. C. Oliver gave a historical sketch of the college and Dr. William T. Sedgwick, of the Massachusetts Institute of Technology, spoke on the relationship of medicine to public health. Dr. Joseph Ransohoff reviewed work of Drake and Holmes and other teachers in the college. Following the addresses, honorary degrees were conferred, and a portrait in oil of Dr. Christian R. Holmes was unveiled.

At the banquet in the evening the principal address was made by the British Ambassador, Sir Auckland Geddes, formerly professor of anatomy at McGill University. President Frederick C. Hicks was the toastmaster and other speakers were: Hon. John Galvin, Judge John Barton Payne, Dr. James R. Angell, Dr. Charles R. Stockard and Dr. Louis Schwab.

Honorary degrees conferred were as follows: Doctor of laws, James Rowland Angell, President of the Carnegie Foundation; Mrs. Mary Muhlenberg Emery; Sir Auckland Geddes; Ludwig Hektoen; professor of pathology, University of Chicago; Christian R. Holmes; Frederick S. Novy, professor of bacteriology, University of Michigan; Hon. John Barton Payne, secretary of the interior; Joseph Ransohoff, professor of surgery, London; William Thompson Sedgwick, professor of biology and public health, Massachusetts Institute of Technology; Louis Schwab, physician. Doctor of science: Charles Cassidy Bass, professor of experimental medicine, Tulane University; Ross Granville Harrison, professor of comparative anatomy, Yale University; Dean DeWitt Lewis, professor of surgery, University of Chicago; Robert Williamson Lovett, professor of orthopaedic surgery, Harvard Medical School; Elmer Vernes McCollum, professor of chemical hygiene,

Johns Hopkins University; William Snow Miller, University of Wisconsin; Charles R. Stockard, professor of anatomy, Cornell Medical College; Henry B. Ward, professor of geology, University of Illinois; John C. Webster, professor of gynecology, University of Chicago; Edwin O. Jordan, professor of bacteriology, University of Chicago.

#### SCIENTIFIC NOTES AND NEWS

THE American Society of Mechanical Engineers, which will hold its annual meeting from December 7 to 10, in the Engineering Societies' Building, New York City, has arranged a memorial program in honor of Dr. John Alfred Brashear, scientific man and maker of astronomical instruments, who died last April in Pittsburgh at the age of eighty years. The principal eulogy of Dr. Brashear will be delivered by Dr. Henry S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching.

DR. WILLIAM C. BRAISTED, surgeon-general, U. S. Navy, and president of the American Medical Association, has been awarded the Navy distinguished service medal for meritorious service during the war.

A PORTRAIT of Dr. William S. Miller, professor of anatomy in the University of Wisconsin Medical School, has been formally presented to the university at exercises held in Science Hall. The portrait was painted by Christian Abrahamson and is the gift of Dr. Miller's colleagues, friends in the medical profession, and former students.

DR. BERNARD L. WYATT, of the Rockefeller Institute, has been made a knight of the Legion of Honor of the French Republic in recognition of his services in organizing the French campaign against tuberculosis.

PROFESSOR T. W. EDGEWORTH DAVID, professor of geology in the University of Sydney, has been appointed a knight commander of the Order of the British Empire for services in connection with the war.

PROFESSOR F. O. BOWER has been elected president of the Royal Society of Edinburgh



and Professor D. Noël Paton, Professor A. Robinson, Sir A. Berry, Professor W. Peddie, Sir J. A. Ewing and Professor J. W. Gregory, have been elected vice-presidents.

At the recent session of the board of trustees held in Chicago, Dr. Rudolph Matas, New Orleans, was elected vice-president of the American Medical Association, succeeding the late Dr. Isadore Dyer.

PROFESSOR C. B. RIDGAWAY, head of the department of mathematics, at the University of Wyoming, is retiring after twenty-four years of service.

DR. ALEXANDER L. MCKAY, Toronto, has accepted an appointment with the Rockefeller Foundation Medical Research Committee.

MR. A. V. BLEININGER, ceramic chemist and head of the ceramic division of the Bureau of Standards, has resigned to become research chemist for the Homer-Laughlin China Company, of East Liverpool, Ohio.

PROFESSOR CLARENCE E. MICKEL has resigned as extension entomologist, college of agriculture, University of Nebraska, to accept a position as research entomologist with the American Beet Sugar Company, Rocky Ford, Colorado.

H. S. MULLIKEN, of Lexington, Mass., has been appointed metallurgical engineer of the Bureau of Mines, and has been assigned by Dr. F. G. Cottrell, the director, as an assistant to him in special professional work connected with the bureau.

PROFESSOR VICTOR LENHER, of the department of chemistry of the University of Wisconsin, has recently been chosen a member of the advisory committee which has been established by the Smithsonian Institution, Washington, to be concerned with the collection of chemical types. The collection was undertaken by the National Museum under the will of Morris Loeb, of New York, who left a fund to the American Chemical Society for chemical research work.

PROFESSOR EDWARD J. KUNZE, head of the department of industrial engineering at the Pennsylvania State College, was elected a di-

rector and vice-president in charge of research, of the Society of Industrial Engineers at their recent convention in Pittsburgh on November 10.

MR. F. V. MORLEY, of the Johns Hopkins University, has been appointed a Rhodes scholar at Oxford University.

DR. SOLOMON LEFSCHETZ, professor of mathematics at the University of Kansas, is absent on leave during this academic year and is at present in Europe.

BARON GERARD DE GEER, professor at the University of Stockholm, delivered a lecture before the students and faculty of the Department of Geology at the University of Minnesota on November 5. The lecture was on his geochronological investigations in Sweden and their application to the Quaternary geology of America.

DR. HIDEYO NOGUCHI, of the Rockefeller Institute for Medical Research, of New York, gave a lecture to the faculty and students of the Army Medical School on November 17, on "Recent studies of yellow fever," at the auditorium of the National Museum.

ON October 28, Professor Daniel Hull, assistant superintendent of the El Paso High School, gave under the auspices of the Southwestern Division, of the American Association, a lecture on "The glacial periods of North America and their relation to astronomy." Before the lecture the tentative program of the coming first annual meeting of the Southwestern Division was announced. The meeting will be held in El Paso on December 2, 3 and 4. Other lectures in El Paso are announced as follows: Mr. R. R. Coghlan, on "Chemistry and manufacture of cement;" November 9, Professor W. H. Seamon, on "Prehistoric mammals," illustrated with lantern slides, on November 16.

A COURSE of twelve free Swiney lectures on geology is being given by Dr. J. D. Falconer, of the Royal School of Mines, South Kensington, beginning on November 8. The subject is "The Modelling of the Earth's Crust."

THE *Journal* of the American Medical Association reports that a national committee

has been at work during the year since the death of Dr. J. G. Hernández, of Caracas, and recently completed its labors by unveiling an oil portrait in the university, with memorial tablet, and also a monument in the cemetery, and founding a biennial prize in his name with a fund of 15,770 bolivars. The tablet and monument bear the inscription "Homenaje Nacional." The ceremonies included a large representative gathering and addresses, with music in the university, and also ceremonies in the cemetery.

IN the recent California referendum the bill prohibiting vivisection was defeated by an overwhelming majority. The other anti-health measures, including anti-vaccination were also defeated.

UNDER date of August 13 Captain Roald Amundsen, the Arctic explorer, sent the following telegram from East Cape, Siberia: "We sailed from Nome immediately after my wire of August 8, with only three men, as the others claimed wages of £300 sterling monthly. The following day we were held up by pack ice in Behring Sea. All aboard well."

IN the fire which destroyed the Agricultural building of the Alabama Polytechnic Institute on October 17, the department library, which probably contained the best collection of American and foreign journals in the south, was destroyed. The plant collections of Underwood, Earle and Atkinson which were part of the department herbarium were burned as was also the research equipment of the department. Dr. Wright A. Gardner and Mr. G. R. Johnstone lost their entire botanical libraries.

THE Yale Corporation has made arrangements for the establishment of four fellowships, to be known as Bishop Museum Fellowships, and to be awarded for study and research in anthropology, botany, zoology, geology and geography. The fellows are to be appointed by the corporation of Yale University from candidates recommended by the trustees of the Bishop Museum in Honolulu. They will receive \$1,000 a year. Their researches, which are to be in the general field

of the science of the Pacific, are to be submitted to the Bishop Museum for publication. Applications for fellowships should be made to the dean of the graduate school of Yale University, or to the director of the Bishop Museum in Honolulu.

THE will of General Rush C. Hawkins gives the residue of his estate to Norwich University at Northfield, Vt. The will also makes specific public bequests of more than \$400,000, including \$100,000 to the University of Vermont, and \$100,000 to Brown University. Of his bequest to Norwich University General Hawkins said he made it because he believed "above all else in a military education, its tendencies being to develop self-respecting, men, who are more likely than others to be faithful in all relations, which should adorn decent society. I am proud of the records made by the Norwich graduates in the field and at sea whenever they have been called upon to serve their country." General Hawkins left \$100,000 to the Society for the Prevention of Cruelty to Animals, of which he had been a director, with the instruction that the income of this bequest be used "to abate the wicked horrors of vivisection and to compel those who practise it to make known to the public the actual methods of their unspeakable calling."

THROUGH the courtesy of the director of naval communications and the commissioner of lighthouses, the Bureau of Fisheries has made arrangements to have the occurrence of schooling fishes reported by the keepers of Pollock Rip, Nantucket Shoals, and Fire Island Lightships. Messages will be sent by radio from each of these vessels at noon daily, reporting any observations which may be made during the preceding 24 hours. The reports will be relayed over the leased wires of the Navy from New York or Newport to Boston Navy Yard, whence they will be communicated by telephone to the Bureau's representative, F. F. Dimick, who will post them at the Fish Exchange and give them such other publicity as may be desirable. Important information of interest to Gloucester fishermen will be telegraphed to Henry F.



Brown, the Bureau's representative at that port, for appropriate publication. The service is being established near the close of the season, but it is desired to have it in working order, so that it may be efficient on the resumption of more active fishing in the spring, when it is hoped to extend it to the coast of Maine.

### UNIVERSITY AND EDUCATIONAL NEWS

A GIFT of \$700,000 to the University of Colorado for the construction of a medical school and hospital by the General Education Board of the Rockefeller Foundation is announced.

Two bequests to Yale University are announced, one of \$46,360 from the late Allen P. Lovejoy, of the class of 1904, of Janesville, Wisconsin, for general university purposes, and one of about \$113,000 from the estate of Levi I. Shoemaker, of Wilkes-Barre, Pa.

THE president of Argentina has approved the law ordering the immediate construction of a surgical institute for the chair at Buenos Ayres in charge of Professor José Arce. Four hundred thousand dollars have been provided for this work.

THE following changes have been made in the pathological chemistry staff of the New York Post-Graduate Medical School and Hospital: George Eric Simpson, Ph.D., has resigned as instructor to become assistant professor of biochemistry at McGill University. James J. Short, M.D., has resigned as instructor to complete his internship in the hospital. To fill this latter position, Hilda M. Croll, A.M., formerly associate professor of physiological chemistry at the Woman's Medical College of Pennsylvania, has been made associate. Cameron V. Bailey, M.D., has been appointed assistant professor, to devote his time largely to respiratory and metabolic work.

THE department of physics, West Virginia University, reports the following additions to the staff: Fred A. Molby, Ph.D. (Cornell); formerly of the University of Cincinnati, asso-

ciate professor. E. F. George, Ph.D. (O. S. U.), formerly of the Research Laboratory of B. F. Goodrich Rubber Company, assistant professor. O. R. Ford, B.S. (Salem), instructor.

MISS LOUISE OTIS, a graduate of Northwestern University, formerly chief chemist of The Arco Company, Cleveland, O., and recently chemist with Glenn H. Pickard, of Chicago, has been appointed instructor in food chemistry at Northwestern University.

PROFESSOR H. H. CONWELL, associate professor of mathematics in the University of Idaho, has resigned to accept a similar position in Beloit College.

### DISCUSSION AND CORRESPONDENCE

#### A POSSIBLE RELATION BETWEEN MECHANICAL, CHEMICAL AND ELECTRICAL QUANTITIES

TO THE EDITOR OF SCIENCE: It is always of interest to find an unexpected numerical relation between different physical constants, and when the only numerical factor turns out to be a multiple of 10, one is led to expect that in the absolute system it is a rational, unity relation, if the units are properly chosen.

At present the numerical connecting link between chemical and electrical quantities is the electrochemical equivalent of silver, an empirically determined constant whose accepted value now is 0.00111800 gram per coulomb. If this value were only about 3/10 of 1 per cent. higher the writer has found the following curious and totally unexpected relation would be true for all the elements:

$$\text{grams} \times g = 10 \times \text{coulombs} \times \text{atomic weight} / g.$$

in which  $g$  is the acceleration of gravity numerically equal to 980.597; it will be noticed that the only coefficient is 10. The faraday (the number of coulombs per gram ion) then would be equal to  $g^2/10 = 96,157$ , now generally taken as 96,500. The first term (grams  $\times g$ ) represents a force in dynes, if the grams represent a mass. The physical meaning of the right hand term is not clear, but to balance the physical dimensions the factor

"atomic weight/*g*" would have to be a force divided by a quantity of electricity, which quotient is called the intensity of an electric field. The atomic weight would then have to be taken to represent something more than a mere number or ratio.

It was thought that perhaps the elimination of all terrestrial factors like the atmospheric pressure, temperature, attraction of gravitation, etc., from the value of this electrochemical constant thereby reducing it to absolute terms which are independent of this earth, might perhaps raise its value by this small amount of  $\frac{3}{10}$  of 1 per cent., though the writer has been informed by very reliable authorities that it seems unlikely that such corrections would equal this amount. Unless this very slight discrepancy can be adjusted it would seem that this curious relation is a mere accidental coincidence of numbers. But when we are asked to believe that masses change with changes of velocities, that is, with accelerations, and that the atoms of the chemical elements are made up of electrons (electric charges) in very rapid orbital motions, again involving accelerations, so-called, it does not seem unreasonable to believe that new and unexpected relations may be found to exist between mechanical, chemical and electrical constants.

CARL HERING

PHILADELPHIA,  
October 13, 1920

THE INFLUENCE OF DRY VERSUS FRESH  
GREEN PLANT TISSUE ON CALCIUM  
METABOLISM

IN SCIENCE, 1920, LII., 318, Hart, Steenbock and Hoppert explain negative calcium balances on dry feed in their experiments, as well as those of Forbes and Meigs, on the destruction of a hypothetical antirachitic vitamine by drying. Mellanby brings evidence to show that the antirachitic vitamine is the same as fat-soluble-A, which is not destroyed in plants by drying. On the contrary, the antiscorbutic vitamine seems to be greatly reduced by drying except in very acid foods (fruits). The marrow tissue of the bones increases in pro-

portion to the bone proper in scurvy and calcium is apparently lost from the bones in this way. In order to make more exact studies of calcium metabolism on guinea-pigs, I feed them calcium-free diets during and for two days before metabolism periods of three days in length. One day periods were not long enough for definite conclusions to be drawn, but three-day periods on a large enough series of animals seemed perfectly reliable. The animals were under starvation conditions as regards calcium, but this lasted only five days, and examination of their bones did not show differences from animals fed liberal amounts of calcium. Animals that had been on a diet of dried plants fourteen days before the experiment, eliminated twice as much calcium as those that had been on a diet of fresh green plants and which during the experiment received calcium-free orange juice. In case of animals that had been twenty-one days on a dry diet, the difference from the controls was more striking. Scurvy appeared in all the animals on the dry diet. It seems possible, therefore, that the loss of calcium in the experiments of Hart, Steenbock and Hoppert may have been due to scurvy and that it is unnecessary to postulate rickets or an antirachitic vitamine.

E. F. ROBB

UNIVERSITY OF MINNESOTA

PURCHASES IN GERMANY

TO THE EDITOR OF SCIENCE: Some of the problems connected with the purchase of books, etc., from Germans at the present time have been alluded to several times in SCIENCE, and further information may not be out of place.

Somewhat less than a year ago I was offered by a German firm, with whom I had dealt for a score of years before the war, the file of a journal I was desirous of purchasing, for 3,000 marks. Somewhat later I received another offer from the same firm for \$420. A few weeks ago the same was again offered, this time at 22,000 marks, and still more recently at 25,000 marks.

As far as I am concerned, the \$420 is a



satisfactory price, but I do strongly object to paying some 20,000 marks more for the set than would a German in Germany; in other words to having the dealer make that profit out of me.

Professor K. A. Hofmann, speaking before the German Chemical Society, justified the present German procedure in the following words:

Von einzelnen unserer ausländischen Mitglieder sind Beschwerden eingegangen, weil wir wegen der Valuta-Verhältnisse das Ausland neuerdings anders behandeln mussten als das Inland. Wie ich kaum hinzuzufügen brauche, handelt es sich hier um Vorübergehende Massnahmen, die mit dem Eintritt normaler Zustände wieder verschwinden werden. Keineswegs, das möchte ich hier ausdrücklich feststellen, haben wir die Absicht, unsere ausländischen Mitglieder prinzipiell anders zu behandeln als die inländischen. Wegen der Entwertung der Reichsmark hatten sich jedoch Verhältnisse herausgebildet, denen zufolge das Ausland unsere Veröffentlichungen für den zwanzigsten Teil des früheren Preises kaufen konnte, während die deutschen Mitglieder das Doppelte zahlen mussten. Der Vorstand, welchem satzungsgemäss die Festsetzung der Preise unserer Veröffentlichungen zusteht, hat dann, vielfachen dringenden Anregungen aus Mitgliederkreise entsprechend, die Auslandspreise erhöht und so festgesetzt, dass unsere ausländischen Mitglieder immer noch weniger zu zahlen haben, als dies früher im Frieden der Fall war. Wir stehen auf dem Standpunkt, dass ein etwaiger Valuta-Gewinn einzig und allein der Gesellschaft zusteht, nicht aber dem einzelnen ausländischen Mitgled. (Italics ours.) . . . Glaubt man, wir würden hier beschliessen, die 'Berichte' im Ausland für  $\frac{1}{2}$ , das 'Zentralblatt' für  $\frac{1}{4}$  und die beiden ersten Bände des 'Beilstein' für zusammen 1 dollar zu verkaufen? Jedes Buch hat doch einen bestimmten Welthandelswert, und der muss aufrecht erhalten werden.

From the German standpoint this sounds very reasonable, but take the case of the "Berichte." The subscription in Germany and Austria is 45 marks; in America it is \$7.50. At present exchange (1.13) \$7.50 in American money is worth 664 marks in Berlin. In other words, an American pays more than 650 marks for that which is sold to a German for 45 marks.

In a recent publication I noticed the following extract from a German firm to an American customer, whose name had given the impression that he was a German:

A word about prices. I take it from your name and connections that you are of German family and am therefore prepared to make most liberal terms. As you doubtless know, it has been generally agreed in commercial circles here that all articles sold to *uitlanders*, and especially to Americans, shall be priced considerably higher than the same thing sold to our fellow-citizens, the idea being to in this way recuperate to some extent from our late overwhelming losses and to make our recent enemies aid us in paying our most outrageous and crushing war debt.

This policy has been adopted *en bloc* by our associated . . . since some time. But as a fellow German, I am prepared to let you have these goods at the Berlin price, this of course being in all confidence, my most dear sir.

What course should a purchaser take who wishes to deal fairly, not only to the Germans, but to himself?

JAS. LEWIS HOWE

#### SCIENTIFIC BOOKS

*Psychology of Nationality and Internationalism.* By W. B. PILLSBURY. D. Appleton and Company, New York and London. 1920. Pp. 314.

The phenomena of collective life have in recent days evoked a great number of half-analyzed conclusions and assertions. A welcome relief from these is the present book, which represents the analysis of one whose point of view is supported by a background of empirical science. There is undertaken an analysis of the nature and development of the national consciousness, and of the place of the nation as an ideal in history, in the conduct and thought of individuals, and in the relations of states to each other.

Definitions of the nation are submitted to criticism. Neither language nor descent gives the key to the common spirit of a nation. Nor is the nation merely an extension of familial or tribal organization. Nationality is first of all a psychological and sociological problem.

It is the common ideals of its members that make the nation. To know to what national group an individual belongs the simplest way is to ask him.

The instinctive gregarious and sympathetic reactions, the fear of group disapproval, these give the constitutional basis, which explain why there is any grouping at all. But it is the acquisition of common ideals, within the individual's own life, that gives the group its persistent unity and determines its membership. The nation as an ideal exists only in the minds of its separate members, but when it does exist it unites them for action. It becomes a common center of thought and emotion, its prestige determines the conduct of the individual in much the same way as does his concept of his self. Although the social mind is but a metaphor, the nation, as a concept, is as real as is the self of the individual, and in the same sense. But the original instincts, the thoughts, the acts, are the instincts, thoughts and acts of individuals, throughout, and the ideals exist only in individual minds, which are themselves always changing in identity.

The development of the nation as a common ideal or concept is favored by, but does not depend solely upon, such incidents as a common ancestry, language, literature, historical continuity, a home land, and definite geographical boundaries. It is especially favored by the urgencies of common danger and the ensuing development of common hatreds of opposing groups. A common hate is one of the most frequently effective factors in making or uniting a nation or a smaller group within the nation. Common fears and animosities in all wars, rather than mutual sympathy and admiration, are what bind the allies into a solid whole. Nationality thrives on opposition.

Since nationality is acquired rather than innate, its affiliations may under appropriate conditions be changed and its loyalties shifted. A chapter is given to the process of naturalization, its conditions, aids, and objective signs. In part the aids to naturalization and amalgamation are identical with those that led to the

development of nations in history. Especially useful are change of habits, language, standards of living. Effective also are the pressure of contempt, group approval of those who change, influence of children who adopt the new ideals and scorn the old. Even race prejudice is seen to play its part as an aid to change in nationality.

The development of the national ideals and standards and the peculiarities of the ideals of different nations are illustrated by sketches of the rise of national spirit in the ancient and modern states. Accounts of the nation as a mob are critically examined and found in the main false. For the most part the nation thinks as does a sane individual in isolation, and the final decisions usually attain the level of the average intelligence. The results of this thinking, the successful conventions and approved ideals, are embodied in the law, in formal government, and the machinery of the state. The relation of the state to the nation is that the state embodies and provides a means for realizing the ideals of the nation. Naturally the means lags behind the ideals.

Whether nationality represents the extreme development of organization or whether it is possible to go beyond and find a larger unity in a community of states is considered in the last chapter. Smaller group loyalties within the nation are shown not to prevent but rather to facilitate the growth of national spirit. So might the rivalry of nations be made an element in inciting to progress in the international community. In no single respect does the psychology of nationality offer any reasonable objection to the formation of an international society or League of Nations, although the super-national state might have to rely to greater degree on the more cooperative instincts, in the absence of the thrilling and amalgamating influence of a common hate.

This review can not hope to give an adequate summary of the book, with its many pertinent problems, its sane and reasonable analysis of them, and its keen interpretation of social phenomena always on the ground that all psychology is of individuals. The failure



to distinguish clearly between "the group" and what we may designate as "unspecified individuals"; the use of the term "society" for forgotten sources of suggestion or for influential individuals, may be occasionally disappointing to the reader whose psychology is still more individualistic than that of the author. The conclusion that low intelligence is not an innate but "merely an acquired characteristic" may not seem necessarily to follow from the evidence presented, and is at least at variance with current views concerning the nature of intelligence. But these are minor points. The general reader and the specialist alike will welcome the book as a substantial contribution to the subject of collective psychology.

H. L. HOLLINGWORTH

#### CALL FOR A MEETING OF GENETICISTS INTERESTED IN AGRICULTURE

THERE is a steadily increasing number of teachers and investigators in the country interested in genetics in its relation to agriculture. The greater proportion of these are connected with agricultural colleges and experiment stations, and in this relationship they encounter a distinctive set of problems and responsibilities. These include questions of organization, scope of teaching and investigation, cooperation, relation to extension activities, and the like. As an example, take the matter of organization, which involves both intradepartmental and interdepartmental relations. Is it preferable that the genetics work and workers in an institution should be brought together in a single departmental organization, or can the interests of the institution, the students and the investigational projects be best served by having different geneticists on the staff attached to such existing departments as animal husbandry, horticulture and agronomy? Each of these plans doubtless has its advantages and its disadvantages.

The question of where and by whom the elementary course in genetics should be taught, and what its scope should be, is an-

other important question on which practise varies greatly in different institutions. To what extent, if at all, should investigators in agricultural experiment stations be limited in their investigations to projects which have more or less immediate practical application? And to what extent can the results of recent advances in genetics be put before the practical breeder and be made of use to him? These examples will serve to indicate the nature of some of the problems which face the geneticists in agricultural institutions. It is felt by those whose names are appended to this letter that much benefit might be derived from a conference of such workers, at which these and other similar questions might be discussed, since mutual advantage could doubtless be derived from the ideas and experience of others. To this end we are proposing that an attempt be made to arrange for such a conference to be held in connection with the meetings of the American Association for the Advancement of Science and affiliated societies in Chicago this winter. The most feasible date can not be stated at this time; it might be necessary, in order to avoid conflicts, that those interested in this project should come a day earlier or stay over a day later than the other meetings.

The organization of a formal society is not at present contemplated, and it should be emphasized that it is not proposed to have a meeting for the presentation of technical papers in genetics, provision for which is already made on the programs of various societies. This is contemplated purely as a conference for the discussion of the problems peculiar to the geneticists of agricultural institutions or other persons interested in the application of genetics to agriculture. Correspondence and suggestions are solicited from all who may be interested in promoting or attending such a meeting. Address communications to L. J. Cole, College of Agriculture, University of Wisconsin, Madison, Wis.

E. B. Babcock, professor of genetics, University of California.

Leon J. Cole, professor of genetics, University of Wisconsin.

- G. N. Collins, Bureau of Plant Industry, Washington, D. C.  
 J. A. Detlefsen, assistant professor of genetics, University of Illinois.  
 R. A. Emerson, professor of plant breeding, Cornell University.  
 H. D. Goodale, biologist, department of poultry husbandry, Massachusetts Agricultural College.  
 John W. Gowen, biologist, Maine Agricultural Experiment Station.  
 H. K. Hayes, professor of plant breeding, University of Minnesota.  
 D. F. Jones, department of plant breeding, Connecticut Agricultural Experiment Station.  
 William A. Lippincott, professor of poultry husbandry, Kansas State Agricultural College.  
 Edward N. Wentworth, Armour's Bureau of Agricultural Research and Economics, Union Stock Yards, Chicago.  
 Sewall Wright, senior animal husbandman, Bureau of Animal Industry, Washington, D. C.

#### DOCTORATES CONFERRED IN THE SCIENCES BY AMERICAN UN- IVERSITIES IN 1920. II

##### ENGINEERING

- COLUMBIA: Mortimer Thomas Harvey, "Bakelite intermediates." Frank Abraham Struss, "Benzoic acid from benzene."  
 GEORGE WASHINGTON: Alanson David Morehouse, "Rainfall and run-off and the hydraulics of drainage ditches."  
 JOHNS HOPKINS: Frederick William Lee, "Electric strength of air under continuous potentials and as influenced by temperature."  
 WISCONSIN: Harold Marion Crothers, "Selective properties of coupled radio circuits."

##### GEOGRAPHY

- HARVARD: Roderick Peattie, "Geographic conditions of the lower St. Lawrence Valley."  
 WISCONSIN: Leonard Bayliss Krueger, Title of thesis not given. Selma Langenhan Schubring, "A statistical study of lead and zinc mining in Wisconsin."

##### Geology

- CALIFORNIA: Nicholas Lloyd Taliaferro, "Manganese deposits of the Sierra Nevada of California." Frank Samuel Hudson, "Geology of the Cuyamaca region, California, with special reference to the origin of the nickeliferous pyrrhotite."

CHICAGO: Paul MacClintock, "Pleistocene history of the lower Wisconsin Valley." Bertram Reid MacKay, "Geology and physiography of the Beauceville map area, Quebec, with special reference to placer gold deposits." Horace Noble Coryell, "Bryozoon fauna of the Stones River formation of central Tennessee." Ralph Works Chaney, "Flora of the Eagle Creek Formation."

ILLINOIS: Clarence Samuel Ross, "Differentiation and contact metamorphism of the Snowbank syenite in the Vermillion iron bearing region of Minnesota." Luther Eugene Kennedy, "Cataquatic granite and porphyry and their contact effects."

MASSACHUSETTS: George Hanson, "Some Canadian occurrences of pyritic deposits in metamorphic rocks."

MINNESOTA: Arthur Jerrold Teije, "Cambrian sedimentation in the Big Horn Mountains."

PRINCETON: Benjamin Franklin Howell, "Cambrian paradoxides beds at Manuels, Newfoundland."

YALE: William Sidney McCann, "Geology and mineral deposits of the Bridge River map-area, British Columbia." Chester Ray Longwell, "Geology of the Muddy Mountains, Nev., with a section to the Grand Wash Cliffs in Arizona." George Sherwood Hume, "Stratigraphy and geologic relations of the Paleozoic outlier of Lake Timiskaming, Ontario." Kirk Bryan, "Geology, physiography, and water resources of the Papago Country, Arizona." Walter Andrew Bell, "Stratigraphy of the Horton-Windsor District, Nova Scotia."

##### MATHEMATICS

- BRYN MAWR: Bird Margaret Turner, "Plane cubics with a given quadrangle of inflexion."  
 CALIFORNIA: Elsie Jeanette McFarland, "On a special quartic curve."  
 CHICAGO: Cyril Arthur Nelson, "Conjugate systems with conjugate axis curves." Gladys Elizabeth Carson Gibbens, "Comparison of different line-geometric representations for functions of a complex variable." John Wayne Lasley, Jr., "Some special cases of the flecnodal transformation of ruled surfaces." William Lloyd Garrison Williams, "Fundamental systems of formal modular seminvariants of the binary cubic."  
 COLUMBIA: Emil L. Post, "Introduction to a general theory of elementary propositions."  
 CORNELL: George Merritt Robinson, "Divergent double sequences and series."



HARVARD: Hyman Joseph Ettlinger, I. "Existence theorems for the general real self-adjoint linear system of the second order. II. Oscillation theorems for the real self-adjoint linear system of the second order." Joseph Leonard Walsh, "On the location of the roots of the Jacobian of two binary forms."

ILLINOIS: Roscoe Woods, "Elliptic modular functions associated with the elliptic norm curve E." Charles Francis Green, "On the summability and regions of summability of a general class of series of the form  $\sum c_n (x+n)$ ." Leonard Leo Steimley, "On a general class of series of the form  $\sum c_n (n-x)$ ."

MICHIGAN: John David Bond, "Plane trigonometry in Richard Wallingford's *quadripartitum de sinibus demonstratis*." Susan Miller Rambo, "Point of infinity as a regular point of certain linear difference equations of the second order."

PRINCETON: Edward Sanford Hammond, "Periodic conjugate nets of curves." Henry Roy Brahans, "Curves on surfaces."

SYRACUSE: Tsao-Shing Yang, "Moving trihedral associated with a triply orthogonal system of surfaces—theory and application." Jason John Nassau, "Some theorems in alternants."

WISCONSIN: Thornton Carle Fry, "Use of divergent integrals in the solution of differential equations."

#### Pathology

CALIFORNIA: Hilda Hempl Heller, "Étiology of acute gangrenous infections of animals: a discussion of blackleg, brazy, malignant œdema, and whale septicæmia."

MINNESOTA: Carl Arthur Hedblom, "Treatment of chronic empyema." Georgine Luden, "Influence of cholesterol metabolism and other factors in carcinoma."

#### Physics

CALIFORNIA: Charles Henry Kunsman, "Study of the residual ionization in gases with reference to temperature effects."

CHICAGO: John Bewley Derieux, I. "Use of mercury droplets in Millikan's experiment. II. Photoelectric effects on mercury droplets." Ralph Alanson Sawyer, "Metallic spark spectra in the extreme ultra violet." Mervin Joe Kelly, "Valency of photo-electrons and the photo-electric properties of some insulators." Harold Horton Sheldon, "Charcoal activation." Oswald Hance Blackwood, "On the existence of homogeneous groups of large ions." Ira Gar-

nett Barber, "Secondary electron emission from copper surfaces." Otto Koppius, "Comparison of thermionic and the photoelectric work-functions in platinum."

CINCINNATI: Harold Frederick Richards, "Electrification by impact."

CORNELL: Austin Bailey, "Study of the effect of adsorbed gas on the high frequency resistance of copper wire."

HARVARD: Yu Ching Wen, "Theoretical treatment of the radiation resistance of antennæ excited by damped and undamped waves at all ranges of wave-lengths." Elmer Raymond Schaeffer, "Atmospheric attenuation of ultra-violet light." David Arnold Keys, "On a piezo-electric method of measuring explosion pressures."

ILLINOIS: William Henry Hyslop, "A method of determining dielectric constants of liquids by undamped oscillations."

IOWA STATE: George Ray Wait, "Hall effect and the specific resistance of thin silver films." Paul Streeper Helmick, "The blackening of a photographic plate as a function of the intensity of light and time of exposure."

MISSOURI: Francis Marion Walters, Jr., "Wave-length measurements in arc spectra photographed in the yellow, red and infra-red."

OHIO STATE: Enoch Franklin George, "Absorption of light by solutions of inorganic salts."

PENNSYLVANIA: George Rosengarten, "Effect of temperature upon the transmission of infra-red radiation through various glasses." John Clarence Karcher, "Wave-length measurements in the M series of some high frequency spectra."

#### Physiology

CALIFORNIA: John Augustus Larson, "Further evidence on the functional correlation of the hypophysis and thyroid."

CHICAGO: Thomas Leon Patterson, "Studies on gastric hunger contractions in amphidia and reptilia." Lester Reynold Dragstedt, "Studies in acute intestinal obstruction." Bernard Raymond, "Alkali reserve in experimental surgical shock." Emma Anna Kohman, "Experimental production and control of hunger edema."

CLARK: Charles Bird, "Genetic study of hunger."

COLUMBIA: Anna Baker Gates, "The mechanism of the recovery or maintenance of systemic blood pressure after complete transection of the spinal cord."

HARVARD: McKeen Cattell, "Some effects of ether and morphine on the blood and circulation in

shock." Edward Frederick Adolph, "Quantitative study of the interrelations of oxygen and carbon dioxide with hemoglobin in blood."

ILLINOIS: Alma Jessie Neill, "Comparison of the rate of diffusion of certain substances."

INDIANA: Paul Montgomery Harmon, "Influence of temperature and other factors upon the two-submitted contraction curve of the gastronemius muscle of the frog."

JOHNS HOPKINS: Helene Connet, "Effect of adrenalin on the venous blood pressure."

LELAND STANFORD: Rollin Guizot Myers, "Studies on the blood of marine animals."

YALE: George Eric Simpson, "Effect of diet on the excretion of indican and the phenols."

### Psychology

CATHOLIC: Othmar Solnitsky, "Factors in economic learning."

CHICAGO: Joseph Ussery Yarbrough, "Influence of time interval upon the rate of learning in the white rat." Chih Wei Luh, "The conditions of retention." Edward Stevens Robinson, "Some factors determining the degree of retroactive inhibition." Guy Thomas Buswell, "Experimental study of the eye-voice span in reading." Forrest Alva Kingsbury, "A group intelligence scale for primary grades." Margaret Wooster, "Certain factors in the formation of a new spatial coordination."

CLARK: Francis Cecil Summer, "Psychoanalysis of Freud and Adler."

COLUMBIA: Dean R. Brimhall, "Family resemblances among American men of science." Evelyn Gough, "Effects of practise on judgments of absolute tone." Myra Elizabeth Hills, "Standardization of the analogies test." Georgina Ida Strickland, "Individual differences as affected by practise."

CORNELL: Hubert Sheppard, "Foveal adaptation to color." Louis Benjamin Hoisington, "On the non-visual perception of the length of lifted rods." Cheves West Perky, "An experimental study of the imagination." Michael Jacob Zigler, "An experimental study of visual form." Homer Guy Bishop, "An experimental investigation of the positive after-image in audition." Claire Comstock, "An experimental study of meaning and imagery." Forrest Lee Dimmick, "Visual movement and the phi phenomenon." Robert Thomas Holland, "The after-image of pressure." Alice Helen Sullivan, "An experimental study of kinæsthetic imagery."

GEORGE WASHINGTON: Dudley Ward Fay, "A psycho-analytic study of some psychoses associated with frank endocrine disorders."

HARVARD: Charles Arthur Coburn, "Heredity of wildness and savageness in mice." George Humphrey, "Conditioned reflex in education." Yueh Tang, "Affective factors in perception." Charles Hart Westbrook, "Measurement of ability in reading." Zenas Clark Dickinson, "Study of the psychological theory of action with reference to economic theory."

ILLINOIS: Coleman Roberts Griffith, "Organic and mental effects of repeated bodily rotation."

INDIANA: Hazel Irene Hansford, "Mental and social survey of a degenerate family." Luella Winifred Pressey, "Measurement of intelligence and school attainment in the first three school grades."

IOWA STATE: Clarence Frederick Hansen, "Serial action as the basic measure of motor capacity."

JOHNS HOPKINS: David June Carver, "Immediate psychological effects of tobacco smoking." Wilbur Harrington Norcross, "Experiments on the transfer of training."

LELAND STANFORD: William Thomas Root, Jr., "Socio-psychological study of 53 supernormal children." James Leroy Stockton, "Definition of intelligence in relation to modern methods of mental measurement." Arthur Sinton Otis, "Absolute point scale for the group measurement of intelligence."

MICHIGAN: Sarah Davina MacKay Austin, "Study in logical memory."

OHIO STATE: Jeanette Chase Reamer, "Mental and educational measurement of the deaf by the group method."

PRINCETON: Edgar Arnold Doll, "Growth of intelligence."

YALE: Arthur Dart Bissell, "Role of expectation in music."

### Zoology

CALIFORNIA: Henry Homer Collins, "Studies of the pelage phases and of the nature of color variations in mice of the genus *Peromyscus*."

CHICAGO: Benjamin Harrison Willier, "Structures and homologues of free-martin gonads."

COLUMBIA: Clara Julia Lynch, "Unisexual sterility in *Drosophila*." Shelby R. Safir, "Genetic and cytological examination of primary non-disjunction in *Drosophila melanogaster*." Franz Schrader, "Sex determination in the white fly." Mary Bertha Stark, "Hereditary tumor in the fruit fly, *Drosophila*."



- CORNELL: Walter Norton Hess, "Studies on the Lampyridæ." Clarence Hamilton Kennedy, "Study of the phylogeny of the Zygoptera." Fred Waldorf Steward, "Development of the cranial sympathetic ganglia in the rat." Benjamin Percy Young, "Attachment of the abdomen to the thorax among Diptera." Laura Florence, "Hog louse, *Hæmatopinus suis*, Linné: its biology, anatomy and histology." Walter Housley Wellhouse, "Insect fauna of the genus *Cratægus*."
- GEORGE WASHINGTON: Benjamin Schwartz, "Hemotoxins from parasitic forms." Frank Alexander Wetmore, "Body temperature of birds." Thomas Elliott Snyder, "Colonizing termites."
- HARVARD: Vasil Obreshkove, "Photie reactions of tadpoles in relation to the Bunsen-Roscoe Law." James Montrose Duncan Olmsted, "Experiments on the olfactory and gustatory organs of *Amiurus nebulosus* (Lesueur)." Herbert Greenleaf Coar, "Shell of *Balanus eburnus*." William Norton Barrows, "Modifications and development of the arachnid palpal claw, with especial reference to spiders." Leslie Clarence Dunn, "Linked genes in mammals." Alfred Charles Kinsey, "Studies of gall-wasps (*Cynipidæ hymenoptera*)."
- ILLINOIS: Hachiro Yuasa, "Classification of the larvæ of Tenthredinoidea."
- INDIANA: William Marion Goldsmith, "Comparative study of the chromosomes of the tiger beetles (*Cicindelidæ*)."
- IOWA STATE: Gertrude Van Wagenen, "Coral *Mussa fragilis*, and its development."
- JOHNS HOPKINS: Bessie Noyes, "Experimental studies on the life history of a rotifer reproducing parthenogenetically (*Proales decipiens*)."
- Hoyt Stilson Hopkins, "Conditions for conjugation in diverse races of *Paramæcium*."
- KANSAS: Paul Bowen Lawson, "Cicadillidæ of Kansas."
- MICHIGAN: Walter Norman Koelz, "Coregonine fishes of Lake Huron."
- MISSOURI: Erwin Ellis Nelson, "Chemical composition of the ovaries and skeletal muscle of the fresh water gar, *Lepidosteus*."
- PENNSYLVANIA: Joseph Hall Bodine, "Factors influencing the water content and the rate of metabolism of certain Orthoptera."
- PRINCETON: Wilbur Willis Swingle, "Germ-cell cycle of *Anurans*. I. The male sexual cycle of *Rana catesbeiana*." Elmer Lentz Shaffer,

"Germ-cells of *Cicada septemdecim* (Homoptera)."

WISCONSIN: Bert Cunningham, "Some studies in the natural history and early development of *Chrysemys cinerea*." George Holman Bishop, Title for thesis not given. Archie Evans Cole, Title for thesis not given.

YALE: Harry Hayward Charlton, "Spermatogenesis of *Lepisma domestica*." Ruth B. Howland, "Experiments on the effect of removal of the pronephros of *Amblystoma punctatum*."

CALLIE HULL,

Technical Assistant

RESEARCH INFORMATION SERVICE,  
NATIONAL RESEARCH COUNCIL

### SPECIAL ARTICLES

#### A METHOD OF STUDYING THE ABSORPTION-TRANSPIRATION RATIO IN NUTRIENT MEDIA

SEVERAL writers have shown that the water content of plants varies with the hour of the day. This variation is of course due to differences in the rates of water entrance and exit. Wilting takes place when the ratio of the rate of entrance to the rate of exit is less than unity whether caused by excessive transpiration or by a decrease in root absorption. These two plant processes may easily be studied as a laboratory exercise in plant physiology by using water culture plants exposed to different environmental conditions or placed in solutions of different osmotic pressures. The following experiment will serve to illustrate the manner in which changes in the strength of solutions affect the ratio of absorption to transpiration. The method here described is practically the same as one used by the writer in a series of experiments reported by Livingston.<sup>1</sup>

The roots of a tomato plant were passed through a hole in the rubber stopper of a large mouth bottle of about 600 c.c. capacity. A water-tight seal of chewing gum was made around the stem of the plant; a 2 c.c. pipette, graduated to 1/20 c.c. and a thermometer were inserted into the bottle through the stopper.

<sup>1</sup> Livingston, B. E., "Incipient Drying and Temporary and Permanent Wilting of Plants, as Related to External and Internal Conditions," Johns Hopkins Univ. Cir., March, 1917, pp. 176-82.

The bottle and pipette were then filled with the nutrient solution, care being taken that no bubbles were inclosed beneath the stopper. Loss in weight of the plant and container gave the amount of transpiration, while the loss of solution from the pipette gave the amount of root absorption after temperature corrections were made. These temperature corrections were made by comparing these pipette readings with those of a pipette in a similar bottle containing no plant, but exposed to the same set of conditions. Transpiration was measured in grams while absorption was measured in cubic centimeters, but as the variations in density of the solutions for these temperature ranges were small in comparison to the actual values dealt with this correction was not made. The experiment was performed on November 6, 1919, in the diffused light of the laboratory during a period when variations in temperature and the index of evaporation were slight.

TABLE I

*Data Showing Rates of Transpiration and Absorption of a Tomato Plant with Roots Immersed Successively in a Three-salt Nutrient Solution of 1.75 Atmospheres Osmotic Pressure, Cane Sugar Solution of 5.06 Atmospheres Osmotic Pressure and Distilled Water*

Period	Hourly Rate of		Ratio $A/T$	Solution and Osmotic Pressure
	Transpiration	Absorption		
	gram	cc.		
1	.41	.44	1.07	3-salt, 1.75 atm.
2	.31	.37	1.19	3-salt, 1.75 atm.
3	.42	.28	.67	Sugar, 5.06 atm.
4	.29	.18	.62	Sugar, 5.06 atm.
5	.41	.46	1.12	Distilled water
6	.32	.39	1.22	Distilled water

When the hourly rate of absorption is in excess of transpiration the ratio,  $A/T$ , is greater than unity and the plant cells increase in turgor. When this rate is less than unity turgor is decreased and if the process is continued long enough the cells become flaccid and the plant is seen to wilt. The plant gained in turgor during the first two periods given in Table I, but during the third and fourth

periods the ratio values decreased very much. This decrease was mainly due to lower absorption rates since the roots were surrounded by a solution much stronger osmotically during these two periods than during the first two. The rates of absorption for the last two periods were greatly increased by placing the roots in distilled water.

EARL S. JOHNSTON

LABORATORY OF PLANT PHYSIOLOGY,  
MARYLAND AGRICULTURAL  
EXPERIMENT STATION

### THE AMERICAN MATHEMATICAL SOCIETY

THE two hundred and twelfth regular meeting of the society was held at Columbia University on Saturday, October 30, 1920, extending through the usual morning and afternoon sessions. The attendance included thirty-five members. President Morley occupied the chair. The council announced the election of the following persons to membership in the society: Dr. P. M. Batchelder, University of Texas; Miss Vevia Blair, Horace Mann School; Mr. E. H. Carus, La Salle, Ill.; Mr. W. E. Cederberg, University of Wisconsin; Mr. R. P. Conkling, Newark Technical School; Mr. P. H. Evans, Northwestern Mutual Life Insurance Company, Milwaukee, Wis.; Mr. B. L. Falconer, U. S. Civil Service Commission, Boston, Mass.; Mr. J. A. Foberg, Crane Junior College, Chicago, Ill.; Dr. Gladys E. C. Gibbens, University of Minnesota; Professor L. E. Gurney, University of the Philippines; Professor Archibald Henderson, University of North Carolina; Miss Jewell C. Hughes, University of Arkansas; Miss Claribel Kendall, University of Colorado; Mrs. M. I. Logsdon, University of Chicago; Mr. R. L. McNeal, General Motors Laboratories, Detroit, Mich.; Mr. H. L. Olson, University of Michigan; Professor Leigh Page, Yale University; Captain H. W. Rehm, Aberdeen Proving Ground, Md.; Mr. Irwin Roman, Northwestern University; Mr. Raleigh Schorling, Lincoln School, New York City; Mr. E. L. Thompson, Junior College, Joliet, Ill.; Dr. Bird M.



Turner, University of Illinois. Four applications for membership in the society were received.

A committee was appointed to audit the accounts of the Treasurer for the current year. A list of nominations of officers and other members of the council was adopted and ordered printed on the official ballot for the annual meeting in December. The treasurer of the society to be elected at the annual meeting was made curator of all property belonging to the society.

It was announced that the next summer meeting of the society will be held, in conjunction with that of the Mathematical Association of America, at Wellesley College.

The following papers were read at the October meeting:

H. S. Vandiver: "On Kummer's memoir of 1857 concerning Fermat's last theorem."

R. L. Borger: "On total differentiability."

Elizabeth LeSturgeon: "Minima of functions of lines."

Joseph Lipka: "Complete geometric characterization of the dynamical trajectories on a surface for any positional field of force."

Joseph Lipka: "Complete geometric characterization of the brachistochrones, catenaries, and velocity curves on a surface."

Dunham Jackson: "On the convergence of certain polynomial approximations."

J. F. Ritt: "On algebraic functions which can be expressed in terms of radicals."

A. A. Bennett: "The Schwarz inequality for a given symmetrical convex region and given bilinear form."

Edward Kasner: "Determination of an Einstein gravitational field by means of the paths of free particles."

O. E. Glenn: "An algorithm for differential invariant theory."

T. H. Gronwall: "Some inequalities in the theory of functions of a complex variable."

W. L. G. Williams: "Fundamental systems of formal modular semi-variants of the binary cubic."

The Southwestern Section will meet at the University of Nebraska on November 27. The annual meeting of the society will be

held in New York, December 28-29. Its western meeting will be held at Chicago, December 29-30.

F. N. COLE,  
*Secretary*

## THE NATIONAL ACADEMY OF SCIENCES

THE program of the autumn meeting, held at Princeton University, was as follows:

TUESDAY, NOVEMBER 16

### Morning Session

"Some approximate computations of x-ray wave-lengths," by W. Duane.

"The Peltier effect," by E. H. Hall.

"New facts bearing on the structure of the helium atom," by R. A. Millikan.

"The measurement of the ionizing potential of metallic surfaces," by R. A. Millikan.

"Further progress in the extreme ultra-violet," by R. A. Millikan.

"Fluorescence and chemical change in very intense light fields," R. W. Wood.

"A high speed photographic recording galvanometer for laboratory or technical use," by A. Trowbridge.

"Explosions of mixtures of coal gas and air under constant volume conditions," by A. Trowbridge.

Excursion to the Rockefeller Institute (department of animal pathology). Inspection of grounds and buildings, followed by luncheon as guests of the institute.

### Afternoon Session

"A post-war use of war material," by L. O. Howard.

"The investigation of the flora of northern South America by the United States National Museum, the Gray Herbarium of Harvard University and the New York Botanical Garden," by N. L. Britton.

"The segregation and control of the light producing substances in organisms," by U. Dahlgren (introduced by E. G. Conklin).

"Rose Atoll, Samoa," by A. G. Mayor. (By title.)

"The tectonic conditions accompanying the intrusion of basic and ultrabasic igneous rocks," by W. N. Benson (introduced by Arthur L. Day.) (Read by title.)

"The oldest forest," by John M. Clarke.

"The evolution of the Proboscidea," by H. F. Osborn.

"The struggle between sun and ice for the past ten thousands of years," by Baron Gerhard De-Geer (introduced by H. F. Osborn).

"Unusual features of sedimentation in the Pennsylvanian strata, Bingham Canyon, Utah," by J. F. Kemp.

"Some geologic conclusions from geodetic data," by W. Bowie (introduced by A. O. Leuschner).

"Origin of the North and South American faunas," by W. B. Scott.

"The red layer, a contribution to the stratigraphy of the White River Oligocene," by W. J. Sinclair (introduced by W. B. Scott).

Reception by President and Mrs. Hibben for members of the Academy and guests, at "Prospect."

Lecture, complimentary to the citizens of Princeton. "Lessons of the Grand Canyon," by Professor W. M. Davis. Room 301, Palmer Laboratory. Following this a smoker was held at the Nassau Club.

WEDNESDAY, NOVEMBER 17

#### *Morning Session*

"Islands near the border of the coral seas," by W. M. Davis.

"Equipartition of energy," by E. B. Wilson.

"Einstein gravitational fields: orbits and light rays," by E. Kasner.

"Note on the Sobral eclipse photographs," by H. N. Russell.

"Knots and Riemann spaces," by J. W. Alexander (introduced by Oswald Veblen).

"The map coloring problem," by Philip Franklin (introduced by Oswald Veblen).

"Luminescence at high temperatures," by E. L. Nichols.

"The molecular state of water vapor," by J. Kendall (introduced by M. T. Bogert).

"The correlation of solubility, compound formation, ionization and electroaffinity in solution," by J. Kendall (introduced by M. T. Bogert).

"The Corbino effect in iron," by E. P. Adams (introduced by H. N. Russell).

"The application of a differential thermometer in ebullioscopy," by W. C. Menzies (introduced by Oswald Veblen).

"Occurrence of copper and zinc in marine animals and calcareous muds," by A. H. Philips (introduced by W. B. Scott).

"The adsorption of gases by metallic catalysts," by Hugh S. Taylor (introduced by Oswald Veblen).

"Experiments on electrical conduction in a hydrogen alloy," by Donald P. Smith (introduced by Oswald Veblen).

#### *Afternoon Session*

"Biological aspects of the process of infection," by Theobald Smith.

"Typhus fever; with description of the ætiology," by S. B. Wolbach (introduced by W. T. Councilman).

"Changes in the ear of the rat on the inception of hearing," by H. H. Donaldson.

"Experiments on the development of the gills in amphibians," by R. G. Harrison.

"An important period in the process of synapsis," by C. E. McClung.

"The sexual cycle of the larval bull-frog," by W. W. Swingle (introduced by E. G. Conklin).

"The basal metabolism of girls 12 to 17 years of age," by F. G. Benedict.

"Growth on diets poor in true fats," by L. B. Mendel. (By title.)

"The measurement of differences between races," by F. Boas. (By title.)

"Anthropology in the army," by C. B. Davenport.

"Further data on population growth," by Raymond Pearl. (By title.)

"The duration of construction of blood vessels by epinephrin," by John Auer (introduced by S. J. Meltzer). (By title.)

"On a life-saving action of epinephrin—with a lantern slide demonstration," by S. J. Meltzer. (By title.)

"Nature of the effect of double vagotomy in rabbits," by Martha Wollstein (introduced by S. J. Meltzer). (By title.)

Subscription dinner of the academy. Proctor Hall, Graduate College.

## SCIENCE

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